

WHAT IS CLAIMED IS:

1. A pump comprising:

an outer body defining a pumping cavity, said outer body comprising an inlet and an outlet in communication with
5 said pumping cavity; and

a housing defining a driving cavity, said housing comprising an outer surface at least partially contained within said pumping cavity;

an excitable medium contained in said driving cavity;

10 an excitation source in communication with said excitable medium to create a standing wave within said excitable medium which causes deformation of said outer surface of said housing, such that a pumped fluid is pumped from said inlet to said outlet through said pumping cavity by said
15 deformation of said outer surface of said housing when said excitation source is operated.

2. The pump of claim 1, wherein said excitation source comprises a transducer in said driving cavity and in contact with said excitable medium.

20 3. The pump of claim 1, wherein said excitation source produces an electrical discharge within said excitable medium.

4. The pump of claim 1, wherein said excitation source produces heat within said excitable medium.

5. The pump of claim 1, wherein said outer body and said housing are cylindrical and co-axial.
6. The pump of claim 1, wherein said inlet is adjacent to a pressure node of said standing wave.
- 5 7. The pump of claim 1, wherein said excitable medium is pre-pressurized to a static pressure greater than one-half the pressure created by said excitation source in said excitable medium.
8. The pump of claim 1, further comprising a one-way check
10 valve in flow communication with said outlet to prevent back-flow into said pumping cavity.
9. The pump of claim 1, further comprising a one-way check valve in flow communication with said inlet to prevent back-flow out of said pumping cavity.
- 15 10. The pump of claim 1, further comprising a sensor in communication within said driving cavity, and in communication with said excitation source to control a frequency of operation of said excitation source to establish said standing wave within said excitable medium.
- 20 11. The pump of claim 10, wherein said sensor comprises a displacement sensor or a pressure sensor.
12. A multi-stage pump comprising:

a plurality of pumps according to claim 8, arranged in series, wherein excitation sources of said plurality of
25 pumps are synchronized.

13. A pump comprising:

- a hollow cylindrical housing forming a driving cavity;
- a hollow cylindrical outer body having a larger diameter than, and positioned co-axially with, said housing and forming a pumping cavity therebetween;
- an excitable medium provided within said driving cavity;
- an excitation source for creating a standing pressure wave in said excitable medium, said standing wave forming pressure nodes and pressure anti-nodes in said excitable medium;
- an inlet in said outer body adjacent to said pressure node of said standing wave; and
- an outlet in said outer body adjacent to said pressure anti-node of said standing wave,
- wherein a pumped fluid is pumped from said inlet to said outlet through said pumping cavity when said excitation source is operated.

14. A method of pumping a pumped fluid comprising:

- exciting an excitable medium provided in a housing to produce a standing wave therein and thereby produce deformations in said housing;
- providing said pumped fluid to a pumping cavity in communication with said housing such that said deformation generates volume changes in said pumping cavity; and

whereby said pumped fluid is pumped through said pumping cavity.

15. A pump comprising:

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a housing defining a driving cavity containing an excitable medium;

an outer body, defining a pumping cavity, said pumping cavity at least partially containing an outer wall of said housing;

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an inlet and an outlet in communication with said pumping cavity to guide a pumped fluid to and from said pumping cavity;

an excitation source in communication with said excitable medium, and operable to produce a travelling mechanical wave within said excitable medium;

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said excitation source, said excitable medium and said driving cavity matched to produce a standing pressure wave within said excitable medium, as a result of said travelling mechanical wave;

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said outer wall of said housing deforming as a result of said standing pressure wave, and thereby exerting pressure on said pumped fluid within said pumping cavity;

said pressure on said pumped fluid forcing said pumped fluid from said pumping cavity through said outlet.

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16. The pump of claim 15, wherein said outer body is cylindrical.

17. The pump of claim 16, wherein said housing is cylindrical, contained within said outer body, and co-axial therewith.
18. The pump of claim 17, wherein said driving cavity has a length equal to an integer multiple of a half wavelength of said mechanical wave within said excitable medium.
19. The pump of claim 18, wherein said inlet is located at a location along a length of said housing proximate a node of said standing pressure wave.
20. The pump of claim 19, wherein said outlet is located at a location along a length of said housing proximate an anti-node of said standing pressure wave.
21. The pump of claim 18, wherein said excitation source comprises a transducer at an end of said housing.
22. The pump of claim 18, wherein said excitable medium comprises one of water, oil, and carbon fuels.
23. The pump of claim 18, wherein said excitation source comprises an electric discharge generator which discharges electricity within said excitable medium.
24. The pump of claim 15, further comprising a one-way check valve in flow communication with said outlet to prevent back flow of said pumped fluid into said pumping cavity.
25. A method of pumping a pumped fluid comprising:
establishing a standing wave within a secondary fluid;

allowing said secondary fluid to exert pressure on a wall in contact with said pumped fluid, to deform said wall;

using deformation of said wall to pump said pumped fluid from an inlet to an outlet, laterally spaced from each other along a length of said wall.

26. A multi-stage pump comprising:

a plurality of pumps as claimed in claim 15, arranged in series, wherein excitation sources of said plurality pumps are synchronized.

27. The pump of claim 18, wherein said inlet is located at a location along a length of said housing proximate an anti-node of said standing pressure wave.

28. The pump of claim 27, wherein said outlet is located at a location along a length of said housing proximate a node of said standing pressure wave.

29. A pump comprising:

an outer body;

a wall within said outer body;

said outer body and said wall defining a pumping cavity and an excitation cavity within said outer body;

an excitable medium within said excitation cavity;

a pumped fluid within said pumping cavity;

an excitation source coupled to said excitable medium;

said excitation source, operable to excite said excitable medium and create a standing wave therein;

said standing wave acting through said wall to pump said fluid through said pumping cavity.